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the resting stages of the mother cell is composed of a number of knots connected by filaments. The pairing of the reticulum appears at a very early stage. The number of pairs of knots, though it is impossible to make an accurate count, far exceeds the number of pairs of chromosomes. She concludes that in Funkia it is inadvisable to call the knots prochromosomes. (2) Occasional contact between the pairs of knots is observed in synapsis, but they do not constitute clear cases of fusion. (3) The double thread is formed from the reticulum during synapsis due to the paired arrangement of the constituents of the nucleus. (4) The double thread fuses into a single spirem, but at the time of segmentation into chromosomes it splits along the line of fusion (thus an element of each bivalent chromosome is not one-half resulting from the division of a single spirem, but an entire piece of the double thread which fused to form a single spirem). (5) Heterotypic division of chromosomes takes place along this fission, so that there is a true reduction division. (6) In each of the daughter chromosomes a new second split occurs longitudinally. (7) The reticulum and knots in the nucleus of the pollen grain are unpaired throughout, but a double structure is found in the prophase of the somatic nucleus. (8) The number of chromosomes in the somatic nucleus of *Funkia ovata* and *F. sieboldiana* seems to vary from 36 to 48, probably is 48, the reduced number being near 24.—S. YAMANOUCHI.

Fossil Osmundaceae.—KIDSTON and GWYNNE-VAUGHAN have recently published a second contribution[15] on the extinct Osmundaceae, which deals anatomically with two species of a new genus (*Zalesskya*) from the Permian of the Ural. *Z. gracilis* and *Z. diploxylon* are characterized by a central cylinder, which the authors infer to be protostelic from the manner of exit of the leaf traces. Unfortunately in one species the center of the fibrovascular tissues of the stem has disappeared through maceration, correlated with fossilization, and in the other by the crumbling away of the stony matrix. The authors admit that the general anatomy of the fossils is not distinctively osmundaceous. They place great diagnostic importance in this connection, however, on the minute structure of the xylem tracheids, which are characterized by multiseriate pits and vessel-like perforations of the pit membranes of the terminal walls. The authors seem to attach a somewhat exaggerated importance to these features, however, since both have long been known to occur in ferns not related to the Osmundaceae. They infer that their fossils make it "clear *that the central ground tissue of the recent Osmundaceae must be regarded as phylogenetically derived by modification from the central xylem of a solid* (sic) *protostele and that primitively it had no relation with the cortex whatever.*" This statement appears to have scarcely a better basis in logic or fact than their contention in the first article that foliar gaps are primitively absent in the Osmundaceae. Even if it be admitted that the authors' species are osmundaceous, which is very far from being certain, the conclusion reached appears hardly in accordance with sound reasoning. The fact that a protostelic genus Lygodium occurs among the living Schizaeaceae, throws no light on the morphological nature of the pith in the central cylinder of the other schizaeaceous genera Schizaea, Aneimia, and Mohria.—E. C. JEFFREY.

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[15] KIDSTON, R., AND GWYNNE-VAUGHAN, D. T., On the fossil Osmundaceae. II. Trans. Roy. Soc. Edinburgh 46^2:213–232. *pls. 1–4.* 1908.

Mitosis in Cynomorium.—BACCARINI[16] has published an account of vegetative mitosis in *Cynomorium coccineum* (Balanophoraceae). From a study of the nucleus in meristem of the roots and in parenchyma of the stem, he finds the following stages: (1) *Prophase:* (*a*) chromatin granules are uniformly distributed throughout the fundamental mass of the nucleus, with or without still larger chromatin knots or joints, the chromocenters; (*b*) the chromatic granules, separating from the faintly staining fundamental mass of the nucleus, aggregate gradually into a distinct number of larger masses, the chromocenters; (*c*) these chromocenters unite to form larger masses, more compact and lengthened, which constitute the prochromosomes; (*d*) some prochromosomes fuse together by their ends into a chain, which finally results in filaments of the spirem; the spirem by this time is homogeneous in structure, but it is uncertain whether it is a single continuous thread; (*e*) the filaments of the spirem segment into a definite number of chromosomes, which seem to be more numerous than the prochromosomes. (2) *Metaphase:* The chromosomes become arranged in the equatorial plate, where they divide and the daughter chromosomes separate. (3) *Anaphase:* The chromosomes accumulate in a convergent bundle at the pole. (4) *Telophase:* The chromosomes dissolve and form the fundamental nuclear mass with its chromatin granules.—SHIGÉO YAMANOUCHI.

Riella.—In the twelfth of the *Archegoniatienstudien*, which he announces to be the last, so far at least as concerns the liverworts, GOEBEL describes the brood buds of *Riella helicophylla*, *R. cossoniana*, and *R. Battandieri*.[17] These organs were first found by UNDERWOOD and HOWE in *R. americana*, and have not yet been observed in *R. Clausonis*. They consist of an unequally two-lobed disk attached by a single stalk cell somewhat excentrically placed on the upper surface. GOEBEL holds these gemmae to be "modified slime papillae," as in Marchantia, an effort at homologizing which seems to us strained. The smaller lobe is loaded with food and therefore heavier; so the gemma sinks in the water with this end down and from it rhizoids arise. The larger lobe, which he calls the germ disk, grows, and especially the meristematic tissue between the two, parting them by a rather long stalk. From the germ disk two plants are produced directly when well nourished, and otherwise one indirectly, that is, only after proliferation of the germ disk. GOEBEL also discusses the systematic position of the genus, concluding on rather doubtful grounds, it seems, that it should

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[16] BACCARINI, P., Sulle cinesi vegétative del *Cynomorium coccineum* L. Nuovo Giorn. Bot. Ital. **15:**189–203. *pl.* 7. 1 08.

[17] GOEBEL, K., Archegoniatenstudien. XII. Ueber die Brutknospenbildung und über die systematische Stellung von Riella. Flora **98:**308–323. *figs. 11.* 1908.